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Fabrication and performance of Ni/MgO methane steam reforming catalysts by exsolution

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Interest in developing alternative energy sources is increasing due to depletion of oil resources and global warming. Therefore, fuel cells, which are new energy conversion and storage devices with low emission of pollutants, are emerging as an alternative. The process of producing hydrogen as a fuel of fuel cells requires a great deal of cost. Therefore, researches are being studying on reforming catalysts for converting natural gas rich in reserved into hydrogen energy and for use in fuel cells. In general, a transition metal (Ni, Co, Cu) or a noble metal (Ru, Pd, Pt) is used as a methane steam reforming catalyst. The noble metal catalyst has excellent catalytic activity and resistance to carbon deposition. But it is becoming a stumbling block to commercialization due to expensive cost. Ni-based catalysts are less expensive than noble metals and have a simple manufacturing process, but the problem of degradation due to carbon deposition and grain growth is pointed out as a disadvantage. In this study, Ni/MgO composite reforming catalyst activated Ni catalyst by exsolution was manufactured to improve durability. The size and amount of precipitated Ni particles were controlled by the reducing temperature and time. The catalytic activity and durability of the catalysts prepared as above were evaluated. The conversion rate of methane was measured and evaluated in the temperature range of 250-750°C and methane:water vapor = 1:2 atmospheres with catalyst in fixed bed reactor. The microstructure and distribution of the produced catalyst were confirmed by XRD and SEM.

Biography

Yong Sun Park is currently pursuing her MS degree in department of materials science and engineering from Inha University, Republic of Korea. Her research interest focuses on fabrication and performance evaluation of methane steam reforming catalysts by exsolution.

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